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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,957	04/12/2004	Takayuki Suzuki	Q80989	2365

23373 7590 01/31/2007

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EXAMINER	
IVEY, ELIZABETH D	
ART UNIT	**PAPER NUMBER**
1775	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,957	SUZUKI, TAKAYUKI	
	Examiner	Art Unit	
	Elizabeth Ivey	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) *3-7* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 6, 2006 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over "High Quality Growth of AlN Epitaxial Layer by Plasma-Assisted Molecular Beam Epitaxy by Jeganathan et al. in view of U.S. Patent 5,810,925 to Tadatomo et al.

Regarding claims 1-2 and 8, Jeganathan discloses wide band gap semiconductors such as AlN, GaN and InN and discloses them as equivalents used in high power electronic devices (page L28). Jeganathan discloses an example of AlN grown on a sapphire substrate resulting in a high structural quality layer 240nm thick wherein the x-ray diffraction full width at half maximum (x-ray diffraction half width) in the asymmetric {11-24} plane is 180sec. (pages L28 and L29). Jeganathan discloses a reduction in dislocation density and an improvement in crystalline quality with increased thickness and discloses the lower halfwidth is due to the reduction in dislocation density (page L29). Jeganathan does not expressly disclose the nitride to be self-supported or to have a diameter of 10mm or more, however, Tadatomo discloses GaN grown on a sapphire substrate to a thickness of not less than 80μm and discloses this thickness as sufficiently thick enough to permit its use as a substrate. Tadatomo discloses the thick nitride material is used for semiconductor light emitting elements. Because Jeganathan discloses AlN and GaN as equivalents used in high power electronic devices, and because Jeganathan discloses AlN with increased thicknesses, which provides reduced dislocation density and higher crystalline quality, it would have been obvious to one having ordinary skill in the art at the time of the invention to use AlN of Jeganathan as a substrate with the thickness of Tadatomo and to thereby adjust the dislocation density to optimize the crystalline quality for the intended application, since it has been held that discovering an optimum value of a result effective

variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The resulting x-ray diffraction halfwidth in the asymmetric {11-24} plane would inherently be 500 seconds or less due to the influence of thickness on the halfwidth as indicated by Jeganathan. Additionally, although Jeganathan and Tadatomo do not expressly disclose a diameter of 10mm or more, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the diameter for the intended application because, where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. *In Re Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)*.

Claims 1-2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over "High Quality Growth of AlN Epitaxial Layer by Plasma-Assisted Molecular Beam Epitaxy by Jeganathan et al. in view of U.S. Patent 6,040,588 to Koide et al.

Regarding claims 1-2 and 8, Jeganathan discloses wide band gap semiconductors such as AlN, GaN and InN and discloses them as equivalents used in high power electronic devices (page L28). Jeganathan discloses an example of AlN grown on a sapphire substrate resulting in a high structural quality layer 240nm thick wherein the x-ray diffraction full width at half maximum (x-ray diffraction half width) in the asymmetric {11-24} plane is 180sec. (pages L28

and L29). Jeganathan discloses a reduction in dislocation density and an improvement in crystalline quality with increased thickness and discloses the lower halfwidth is due to the reduction in dislocation density (page L29). Jeganathan does not expressly disclose the nitride to be self-supported or to have a diameter of 10mm or more, however, Koide '588 discloses a semiconductor light emitting element comprising a nitride (GaN) semiconductor element deposited on a sapphire substrate. Because Jeganathan discloses AlN and GaN as equivalents used in high power electronic devices, and because Jeganathan discloses AlN with increased thicknesses provides reduced dislocation (carrier) density and higher crystalline quality, it would have been obvious to one having ordinary skill in the art at the time of the invention to use AlN of Jeganathan as a substrate as in Kiode '588 with a thickness and thereby the dislocation density adjusted to optimize the crystalline quality for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The resulting x-ray diffraction halfwidth in the asymmetric {11-24} plane would inherently be 500 seconds or less due to the influence of thickness on the halfwidth as indicated by Jeganathan. Additionally, although Jeganathan and Kiode '588 do not expressly disclose a diameter of 10mm or more, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the diameter for the intended application because, where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. *In Re Gardner v. TEC*

Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Claims 1-2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over "High Quality Growth of AlN Epitaxial Layer by Plasma-Assisted Molecular Beam Epitaxy by Jeganathan et al. in view of U.S. Patent 6,420,733 to Koide et al.

Regarding claims 1-2 and 8, Jeganathan discloses wide band gap semiconductors such as AlN, GaN and InN and discloses them as equivalents used in high power electronic devices (page L28). Jeganathan discloses an example of AlN grown on a sapphire substrate resulting in a high structural quality layer 240nm thick wherein the x-ray diffraction full width at half maximum (x-ray diffraction half width) in the asymmetric {11-24} plane is 180sec. (pages L28 and L29). Jeganathan discloses a reduction in dislocation density and an improvement in crystalline quality with increased thickness and discloses the lower halfwidth is due to the reduction in dislocation density (page L29). Jeganathan does not expressly disclose the nitride to be self-supported or to have a diameter of 10mm or more, however, Koide '733 discloses a semiconductor light emitting element comprising a nitride (GaN) semiconductor element deposited on a sapphire substrate. Because Jeganathan discloses AlN and GaN as equivalents used in high power electronic devices, and because Jeganathan discloses AlN with increased thicknesses provides reduced dislocation (carrier) density and higher crystalline quality, it would have been obvious to one having ordinary skill in the art at the time of the invention to use AlN

of Jeganathan as a substrate as in Kiode '733 with a thickness and thereby the dislocation density adjusted to optimize the crystalline quality for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The resulting x-ray diffraction halfwidth in the asymmetric {11-24} plane would inherently be 500 seconds or less due to the influence of thickness on the halfwidth as indicated by Jeganathan. Additionally, although Jeganathan and Kiode '733 do not expressly disclose a diameter of 10mm or more, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the diameter for the intended application because, where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. *In Re Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)*.

Claims 1, 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over "High Quality Growth of AlN Epitaxial Layer by Plasma-Assisted Molecular Beam Epitaxy by Jeganathan et al. in view of U.S. Patent 6,407,409 to Cho et al.

Regarding claims 1-2 and 8, Jeganathan discloses wide band gap semiconductors such as AlN, GaN and InN and discloses them as equivalents used in high power electronic devices(page L28). Jeganathan discloses an example of AlN grown on a sapphire substrate resulting in a high structural quality layer 240nm thick wherein the x-ray diffraction full width at half maximum (x-ray diffraction half width) in the asymmetric {11-24} plane is 180sec. (pages L28 and L29). Jeganathan discloses a reduction in dislocation density and an improvement in crystalline quality with increased thickness and discloses the lower halfwidth is due to the reduction in dislocation density (page L29). Jeganathan does not expressly disclose the nitride to be self-supported or to have a diameter of 10mm or more, however, Cho discloses a semiconductor light emitting element comprising an epitaxial nitride single crystal including n-type doping Because Jeganathan discloses AlN and GaN as equivalents used in high power electronic devices, and because Jeganathan discloses AlN with increased thicknesses provides reduced dislocation (carrier) density and higher crystalline quality, it would have been obvious to one having ordinary skill in the art at the time of the invention to use AlN of Jeganathan as a substrate as in Cho with a thickness and thereby the dislocation density adjusted to optimize the crystalline quality for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The resulting x-ray diffraction halfwidth in the asymmetric {11-24} plane would inherently be 500 seconds or less due to the influence of thickness on the halfwidth as indicated by Jeganathan. Additionally, although Jeganathan and Cho do not expressly disclose a diameter of 10nm or more, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the diameter for the intended application

because, where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. *In Re Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)*.

Response to Arguments

Applicant's arguments with respect to claims 1-2 and 8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Ivey whose telephone number is (571) 272-8432. The examiner can normally be reached on 7:00- 4:30 M-Th and 7:00-3:30 alt. Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elizabeth D. Ivey

JENNIFER MCNEIL
SUPERVISORY PATENT EXAMINER
1/24/07